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IS 5867 (1970): Leatherboards for Insoles [CHD 17: Leather, Tanning Materials and Allied Products]



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(Reaffirmed 2009)

Indian Standard
SPECIFICATION FOR
LEATHERBOARDS FOR INSOLE

(First Reprint NOVEMBER 1985)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 5

April 1971

AMENDMENT NO. 1 JULY 1993
TO
IS 5867 : 1970 SPECIFICATION FOR LEATHER
BOARDS FOR INSOLES

(*Page 3, clause 0.2, line 1*) — Delete 'tanned or'.

(*Page 5, clause 4.5.1, line 2*) — Substitute ' ± 0.2 mm' for ' ± 0.1 mm'.

(CHD 017)

Reprography Unit, BIS, New Delhi, India

Indian Standard

SPECIFICATION FOR LEATHERBOARDS FOR INSOLES

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Indian Standard

SPECIFICATION FOR LEATHERBOARDS FOR INSOLES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 52 June 1970, after the draft finalized by the Leather Sectional Committee had been approved by the Chemical Division Council.

0.2 Leatherboard is a type of fibre board having a portion as tanned or untanned leather or collagen fibre. It is mostly used by footwear and travel goods industry. Board of proper grade and quality used as various footwear components are expected to function properly in wear provided the footwear is correctly designed and constructed and the substances of the boards are adequate. Leatherboard is also more economical than leather. While formulating this standard the committee felt the need to specify the requirements for surface water absorption and stiffness tests based on SATRA methods but decided to keep them as optional in view of the very limited facilities available for carrying out tests there.

0.3 In the formulation of this standard considerable assistance has been received from the British Shoe and Allied Trade Research Association and the article 'Requirements of leatherboards for footwear by Srinivasan (NR) published in the *Tanner* (1964), Vol 5, P 145-51'.

0.4 This standard contains clauses **4.3**, **4.5** and **6.1** which call for agreement between the purchaser and the supplier.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and test for leatherboards for footwear insoles.

*Rules for rounding off numerical values (*revised*).

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1.1.1 Boards containing only cellulose fibre, known sometimes in the trade as leatherboards, are not covered in this standard.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definition and those given in IS : 1640-1960* shall apply.

2.1 Leatherboard — A type of fibre board in which a portion of the fibre is tanned or untanned collagen fibre.

3. TYPES

3.1 Depending upon the percentage of leather fibre content, there shall be two types of leatherboards, namely:

- a) *Type 1* — containing minimum 25 percent of leather forming material.
- b) *Type 2* — containing minimum 50 percent of leather forming material.

4. REQUIREMENTS (MANDATORY)

4.1 Manufacture — A portion of the fibres used in the leatherboard shall be made up of tanned or untanned collagen fibre. Board shall be manufactured from a suitable mixture of long and short fibres and well consolidated.

4.2 Fungicidal Additives — During manufacture suitable fungicidal additives shall be incorporated in the leatherboards so as to prevent mould growth during storage and use.

NOTE — The following fungicides have been found satisfactory:

- a) *p*-nitrophenol,
- b) pentachlorophenol,
- c) *p*-chloro-meta-xlenol,
- d) 2-mercaptobenz thiazole,
- e) 2-4-5 trichlorophenol, and
- f) sodium orthophenyl phenate.

4.2.1 The material shall show no growth of mildew when examined visually or otherwise after the completion of the test prescribed in Appendix A.

4.3 Cutting — Leatherboard shall be cut clean. It shall be of square pattern. The dimensions shall be subject to agreement between the purchaser and the supplier. All cut edges shall be free from loose fibres and dust.

4.4 Appearance — The leatherboard shall be smooth and flat. Both sides of the board shall be clean and free from loosely bound fibres.

4.5 Thickness — The thickness of the leatherboard shall be as agreed to between the purchaser and the supplier.

*Glossary of terms relating to hides, skin and leather.

4.5.1 The tolerance on agreed thickness when measured according to the method LP:2 of IS : 5914-1970* shall be ± 0.1 mm.

4.5.2 The variation of thickness in an individual board shall be not more than ± 0.1 mm.

4.6 Physical Requirements—The material shall comply with the physical requirements as given in Table 1.

TABLE 1 PHYSICAL REQUIREMENTS FOR LEATHERBOARDS

SL No.	CHARACTERISTIC	REQUIREMENTS		METHOD OF TEST, REP TO	
		Type 1	Type 2	This Standard	*IS : 5914-1970
(1)	(2)	(3)	(4)	(5)	(6)
i)	Density, g/cm^3 , <i>Max</i>	1.1	1.1	—	LP : 5
ii)	Water absorption, percent by weight, <i>Max</i> :			—	LP : 11
	a) In 1 h	20	20		
	b) In 24 h	40	40		
iii)	Tensile strength in dry condition, kg/cm^2 , <i>Min</i>	80	60	—	LP : 6
iv)	Tensile strength in wet condition, kg/cm^2 , <i>Min</i>	65	50	8.1.2	LP : 6
v)	Elongation at break percent, <i>Max</i>			8.1.2	LP : 6
	a) Dry condition	25	25		
	b) Wet condition	40	40		
vi)	Area shrinkage percent area, <i>Max</i> :			8.1.3	
	a) At 60°C for 1 h	4	4		
	b) At 100°C for 1 h	6	6		
vii)	Linear shrinkage at 170°C, <i>Max</i>	5	5	8.1.4	—
viii)	Crack resistance	Shall not crack	Shall not crack	8.1.5	—
ix)	Stitchtear strength (double hole), kg/cm thickness, <i>Min</i>	50	50	Appendix B	—
x)	Flexing endurance, number of cycles, <i>Min</i>	50 000	50 000	Appendix C	—

*Methods of physical testing of leather.

*Methods of physical testing of leather.

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4.7 Chemical Requirements—The material shall comply with the chemical requirements calculated on 14 percent moisture basis, as given in Table 2.

TABLE 2 CHEMICAL REQUIREMENTS FOR LEATHERBOARDS

SL No.	CHARACTERISTIC	REQUIREMENT		METHOD OF TEST IN IS : 582-1970*
		Type 1	Type 2	
(1)	(2)	(3)	(4)	(5)
i)	Mineral ash, percent by weight, <i>Max</i>	2.5 in excess of Cr ₂ O ₃ content		LC : 3 and LC : 10
ii)	Water soluble matter, percent by weight <i>Max</i>	5	5	LC : 6
iii)	Leather forming material (cal- culated as hide substance on the material), <i>Min</i>	25	50	LC : 5

*Methods of chemical testing of leather (*first revision*)

5. REQUIREMENTS (OPTIONAL)

5.1 Surface Water Absorption—The mean surface water absorption shall be not less than 5 mg/cm² and not more than 25 mg/cm², when tested according to the method prescribed in Appendix D.

5.2 Stiffness Test Requirements—The material, when tested according to Appendix E, shall comply with the following requirements:

	<i>Lengthwise</i>	<i>Across</i>
Stiffness modulus, kg/cm ² , <i>Min</i>	12 000	20 000
Stiffness, kg.cm	4 to 7	2 to 4

6. PACKING AND MARKING

6.1 The boards shall be securely and suitably packed as agreed to between the purchaser and the supplier.

6.2 Each package shall be marked with the following information:

- Description of the material including type;
- Thickness/weight per sheet and size of sheet;
- Weight of package in kg;
- Batch number; and
- Manufacturer's name and recognized trade-mark, if any.

6.2.1 Individual boards or packages or both may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers of processors, may be obtained from the Indian Standards Institution.

7. SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Scale of Sampling — The method of drawing representative samples and the criteria for conformity shall be as prescribed in Appendix F.

7.2 Criteria for Conformity — Representative samples tested shall conform to all the requirements prescribed under **4** of this standard.

8. TEST METHODS

8.1 Physical Tests

8.1.1 Standard Atmospheric Conditions for Physical Tests — Unless otherwise required by the particular method of test, the test piece shall be conditioned to a moisture equilibrium in an atmosphere of 65 ± 2 percent relative humidity and temperature of $27 \pm 2^\circ\text{C}$ (see IS: 196-1966*) and if possible, tested in that atmosphere or soon after removal from that atmosphere.

8.1.2 Physical Tests — Physical tests regarding tensile strength, elongation at break, water absorption and density and stitchtear strength shall be done in accordance with the methods prescribed in IS : 5914-1970† and Appendix B of this standard as indicated in Table 1.

8.1.2.1 For determining the tensile strength in wet condition, after conditioning, measure the thickness of the test pieces and soak in water at room temperature for 6 hours immediately prior to test by suspension. Then determine the tensile strength of the test piece as prescribed in IS : 5914-1970†.

8.1.3 Area Shrinkage Test — Cut small rectangular test pieces measuring approximately 5×5 cm in area. Place them on a piece of oil paper and carefully take their outline with a pencil. Soak the test pieces for five minutes in water at room temperature and transfer them to ovens maintained at $60 \pm 2^\circ\text{C}$ and $100 \pm 2^\circ\text{C}$ and keep them for one hour. Remove

*Atmospheric conditions for testing (revised)

†Methods of physical testing of leather.

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the test pieces and outline them again with pencil. Compare the original area with the new and find out the amount of shrinkage as follows:

$$\text{Shrinkage, percent area} = \frac{100 (A - B)}{A}$$

where

A = area of the test piece before immersion in water, and

B = area of the test piece after immersion in water.

8.1.4 Linear Shrinkage Test — Cut 3×5 cm rectangular test pieces. Place them on a piece of oil paper and carefully take their outlines with pencil. Measure the length (l_0). Soak the test piece for five minutes in water at room temperature and transfer them to an oven maintained at $90 \pm 2^\circ\text{C}$ for 10 minutes and then to an oven at $170 \pm 2^\circ\text{C}$ for 8 minutes. Remove the test piece and outline them again (l_1). Compare the original length with the new length and find out percent of linear shrinkage.

$$\text{Linear shrinkage, percent} = \frac{100 (l_0 - l_1)}{l_0}$$

where

l_0 = original length, and

l_1 = length after heat treatment.

8.1.5 Determination of Crack Resistance — Bend the test piece around a mandrel of diameter not more than three times the thickness of the board. Examine the test piece for any visible crack

8.2 Chemical Tests — Tests regarding mineral ash, water soluble matter and leather fibre shall be done in accordance with the methods prescribed in IS : 582-1970*. Reference to relevant methods of IS : 582-1970* has been given in col 5 of Table 2.

8.2.1 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (see IS : 1070-1960†) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

8.2.2 Calculation of Chemical Results on 14 Percent Moisture Basis — Multiply the actual percentage of results obtained for individual chemical characteristics by the following factor:

$$\text{Factor} = \frac{86}{100 - x}$$

where

x = actual moisture percent determined on the sample of leatherboard.

NOTE — All results of chemical analysis are expressed on 14 percent moisture basis in order to have values comparable with one another.

*Methods of chemical testing of leather (first revision).

†Specification for water, distilled quality (revised).

APPENDIX A

(Clause 4.2.1)

TEST FOR MILDEW RESISTANCE

A-1. OUTLINE OF THE METHOD

A-1.1 Untreated leather boards as well as those leatherboards treated with agents to promote mould resistance are smeared, sprayed or swabbed with mixed spore suspension of species of moulds given in **A-4.1** and the resistance of such leatherboards to the growth of moulds is evaluated.

A-1.2 Conditions prescribed for sample preparation in this test method correspond to the conditions to which the leatherboards are subjected in use and normal storage.

A-2. SAMPLE

A-2.1 The sample shall be treated as follows:

One portion of the sample (*a*) is kept for seven days at $45 \pm 2^\circ\text{C}$ in an oven with forced air circulation and leached by drumming for three hours in about 30 times its weight of water at $27 \pm 2^\circ\text{C}$ (*see* IS : 196-1966*). The leached samples are then drained and blotted.

The second portion (*b*) of the sample is tested as received.

Cut four strips of 50×10 mm test piece from the treated as well as untreated samples.

A-3. APPARATUS

A-3.1 Containers for Keeping Test Pieces — Any suitable glassware which may be conveniently stoppered, namely, jars, desiccators, glass tanks, etc., with greased covers to preclude loss of water vapour during the test may be used. The vessel may contain water at the bottom or cotton wool or clean sand previously saturated with boiling water. This is done to obtain 100 percent relative humidity at approximately 30°C .

NOTE—The same vessel shall not be used for simultaneous testing of test piece treated with different fungicides.

A-3.2 Incubator — One capable of maintaining $45 \pm 2^\circ\text{C}$ with forced air circulation and another capable of maintaining $30 \pm 2^\circ\text{C}$.

A-4. REAGENTS

A-4.1 Standard Mixed Spore Suspension — Standard mixed spore suspension of the following culture of species of moulds are to be used in the test:

Asperigillus niger

Asperigillus flavus

Asperigillus terreus

Asperigillus nidulans

Paecilomyces varioli

Pencillium frequentans

NOTE — At present, only sand spore suspension of species of mould, usually found in tanned leathers, are supplied by the Central Leather Research Institute, Madras.

*Atmospheric conditions for testing (*revised*).

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A-5. PROCEDURE

A-5.1 Dampen the treated test pieces (*see A-2.1*) with sufficient water for about five minutes; smear, spray or swab with mixed spore suspension and then subsequently suspend them above a free water surface in a suitable covered vessel as described under **A-3.1**.

A-5.2 Viability Control— Simultaneously, tests shall be carried out with control test pieces of leatherboards not treated with fungicides (*see A-2.1*). If this untreated material fails to show any abundant growth of the test organism, the test shall be considered inconclusive and the whole test be repeated.

A-5.3 Incubation— Incubate the test pieces for 30 days at $30 \pm 2^{\circ}\text{C}$ and 95 to 100 percent relative humidity in the incubator (*see A-3.2*) or relative humidity cabinet, kept in the dark.

A-5.4 The test pieces shall be examined at frequent intervals, at least once a week and the date of the first appearance of mould growth shall be noted.

A-6. ASSESSMENT OF RESISTANCE TO MOULD ATTACK

A-6.1 Presence or absence of mould growth as well as the extent of growth at the end of the incubation period may be assessed visually and indicated in the test report as vigorous (entire surface of test piece covered with mildew in test period), moderate ($\frac{3}{4}$ surface of test piece covered with mildew in test period), slight ($\frac{1}{2}$ surface of test piece covered with mildew in test period), very slight ($\frac{1}{4}$ surface of test piece covered with mildew in test period), and nil (no growth of mildew).

A-6.2 The test report shall also state the following:

- a) The number of test pieces tested;
- b) Nature of the test pieces tested, (a) or (b) [**A-2.1**];
- c) The date of incubation; and
- d) The date of first appearance of mould growth.

APPENDIX B

[*Table 1, Item (ix)*]

METHOD FOR DETERMINATION OF STITCHTEAR STRENGTH (DOUBLE HOLE)

B-1. SCOPE

B-1.1 This method is intended for determining the stitchtear strength of the leatherboards employing double holes and a wire.

B-2. APPARATUS

B-2.1 Metal Wire—A piece of soft metal wire 1.000 ± 0.025 mm in diameter, not less than 100 mm in length.

B-2.2 Means to Make Double Hole—A punch or other instrument for making a hole 2 mm in diameter in the test piece.

B-2.3 Testing Machine—Similar to the machine used for testing tensile strength prescribed in IS 5914-1970* except that the jaws of the grips of the machine shall be covered with a material suitable for protecting the gripping surface from damage by contact with metal wire

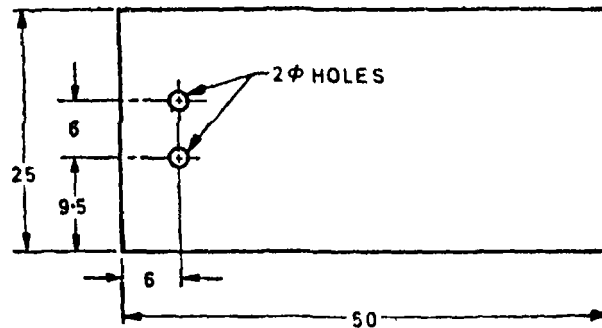
B-3. TEST PIECE

B-3.1 The test piece shall be a rectangular piece of leatherboard 50 mm in length and 25 mm in width cut from the sample of leatherboard

B-4. PROCEDURE

B-4.1 The bent wire shall be in contact with any one side of the test piece.

B-4.1.1 The test piece shall be free from mechanical damage and defects. Punch two holes each 2 mm diameter in the test piece as in Fig 1. Make the metal wire into U-shape and pass through the two holes so that both ends project from the side of the test piece. Clamp the ends of the wire in the wrapped grips of the testing machine. Grip the free end of the test piece in the other grip of the machine described in **B-2.3** Apply force to the test piece at such a rate that the actuated grip travels at a uniform speed of 25 ± 5 cm per minute. Note the force required to tear the test piece at the moment of the initial tear of the test piece.



All dimensions in millimetres

FIG. 1 DIMENSIONS OF TEST PIECE FOR STITCHTEAR STRENGTH
(DOUBLE HOLE)

*Methods of physical testing of leather

B-5. RESULTS

B-5.1 Test one test piece from each of the samples. Test three samples.

B-5.2 Average the test results to obtain the double-hole tear strength.

B-5.3 Record to the nearest 0.5 kg of the double-hole tear strength of the sample.

APPENDIX C

[Table 1, Item (x)]

DETERMINATION FOR FLEX RESISTANCE

C-1. OUTLINE OF THE METHOD

C-1.1 This method of test determines resistance to initial cracking of leatherboards cut out directly from the material by the Ross flexing machine.

C-2. APPARATUS

C-2.1 Ross Flexing Machine— A schematic diagram of Ross flexing machine is given in Fig. 2. The machine allows the fixed area of the specimen to bend freely over a rod of approximately 9.5 mm in diameter through an angle of 90°.

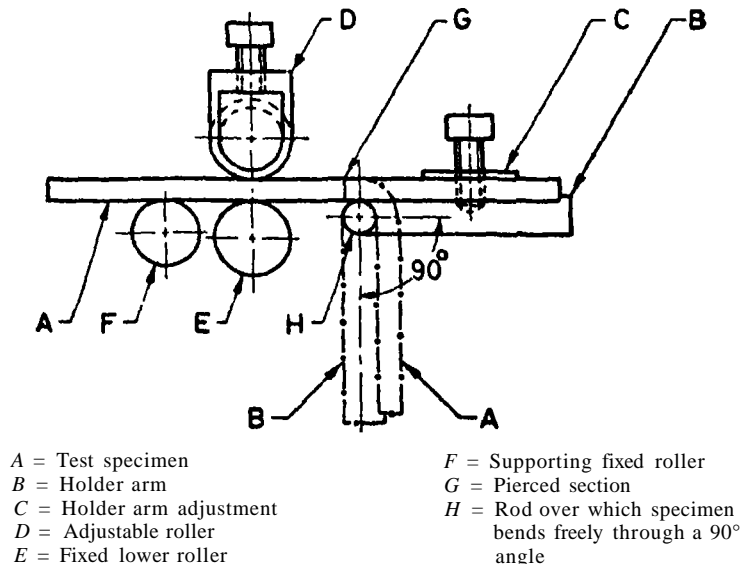


FIG. 2 SCHEMATIC DIAGRAM OF ROSS FLEXING MACHINE

C-3. TEST PIECE

C-3.1 Cut out directly from the leatherboard, test pieces of dimensions 25 ± 1 mm width and a minimum of 150 mm in length, by the standard knife for cutting samples of Ross flexing machine.

C-4. PROCEDURE

C-4.1 Clamp the test pieces to the holder arm of the flexing machine in such a position that the surface of the leatherboard could be flexed at 90° . The holder arm shall be in a horizontal position when the test pieces are attached. Let down the adjustable top rollers until they just touch the holder and lock in this position by means of the wing nuts, permitting free travel of the test pieces between the rollers during the bending movement.

C-4.2 After the test pieces have been attached as described, start the machine at 100 ± 5 cycles per minute. Make frequent observations and record the number of cycles at the initial crack. Record the number of cycles by the use of the counter.

C-5. REPORT

C-5.1 Report the results from observation of at least two test pieces average and report as the number of cycles for the initial crack.

A P P E N D I X D

(*Clause 5.1*)

SURFACE WATER ABSORPTION TEST FOR LEATHERBOARDS

D-1. OUTLINE OF THE METHOD

D-1.1 A disc of the material is clamped in a ring clamp, thus forming a dish into which water is poured. The absorption of water by the board is measured by weighing the disc before and after the period specified.

D-2. APPARATUS

D-2.1 Surface Water Absorption Apparatus — Essentially this consists of ring clamp of internal diameter 4.5 cm (area 16 cm^2) which is held firmly against the surface of the test piece to contain the 25 ml of water which is placed in the ring clamp.

D-2.2 Minute Timer

D-2.3 Blotting Paper

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D-3. TEST PIECE

D-3.1 Disk, 57 mm in diameter.

D-4. CONDITIONING

D-4.1 Condition at $27 \pm 2^\circ\text{C}$ and 65 percent relative humidity for 48 hours before test and carry out the test in this standard atmosphere.

D-5. PROCEDURE

D-5.1 Weigh the test piece (exactly to 1 mg). Clamp the test piece in the surface water absorption apparatus, lay this horizontally in a shallow dish on the bench and with the pipette, run 25 ml of distilled water into the cavity. After 15 minutes pour off the water as quickly as possible, remove the test piece from the clamp, blot to remove any excess moisture and reweigh (to 1 mg).

D-6. CALCULATION

D-6.1 Calculate the surface water absorption to the nearest whole number from the formula:

$$\text{Surface water absorption, mg/cm}^2 = \frac{W}{16}$$

where

W = weight in mg of the water absorbed.

APPENDIX E

(*Clause 5.2*)

STIFFNESS TEST FOR STIFF LEATHERBOARD

E-1. OUTLINE OF THE METHOD

E-1.1 A strip of the board is supported near the ends and loads added to a stirrup suspended from the middle of the strip. The load required to produce a deflection of 1 cm is determined, and the stiffness modulus of the material calculated from this load and the test-piece dimension. A measure of the actual stiffness of the material in the thickness supplied is also derived.

E-2. APPARATUS

E-2.1 Thickness Gauge — (load 500 g weight on a 1 -cm diameter presser foot.) Segment of 2.5 cm diameter mandrel to take a 15×2.5 cm test piece round its curved periphery.

B-2.2 Stiffness Tester—Essentially this consists of two horizontal and parallel 0.5 cm diameter roller supports for the test piece spaced 100 cm apart, stirrup-weights sets for centre loading this test piece, and means for measuring the stirrup depression on scale, with 1/2 mm graduation, which can be set to zero on addition of the stirrup pre-load. Four stirrup weight sets are required:

First set	Stirrup and increment weights	Each 50 g
Second set	„	Each 100 g
Third set	„	Each 200 g
Fourth set	„	Each 400 g

E-2.3 Seconds Timer

E-3. TEST PIECE

E-3.1 From each of the two principal directions cut three rectangles 15 × 25 cm

E-4. CONDITIONING

E-4.1 Condition at $27 \pm 2^\circ\text{C}$ and 65 ± 2 percent relative humidity for 48 hours before cutting and carry out the test in this standard atmosphere.

E-5. PROCEDURE

E-5.1 Measure the thickness (to 0.01 mm) about 2.5 cm on each side of the centre of each test piece. From the mean thickness and the following table determine the stirrup and increment weights to be used

<i>Mean Thickness</i>	<i>Weights of Stirrup and Increment Weights to be Used</i>
mm	g
Up to 1.5	50
1.5 „ 2.49	100
2.5 „ 3.49	200
3.5 or over	400

E-5.2 Bend the test piece one way round the mandrel. Reverse and bend the other way. Straighten to complete the pre-flexing cycle. Rest the test piece centrally on the horizontal supports of the stiffness apparatus, with the side which was last convex upwards. Pre-load the centre with the appropriate stirrup. After 30 seconds adjust the vertical scale so that the pointer on the stirrup is opposite a centimetre mark on this scale. Depression measurements are taken from this mark as zero. Immediately load the stirrup with the first increment weight, watching the depression. Repeat this procedure of loading with an increment weight every 30 seconds until the addition of one of the weights increases the depression from under 1 cm to over 1 cm.

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E-5.3 Note the load producing the deflection just under 1 cm and the corresponding depression (to 0.1 cm).

E-6. CALCULATION

E-6.1 Calculate for each test piece the stiffness modulus using the formula:

$$\text{Stiffness modulus, kg/cm}^2 = \frac{W \times l^3}{4 \times t^3 \times b \times d}$$

where

W = load in g added to stirrup,
 l = spacing between supports in cm,
 t = mean thickness in cm,
 b = width of the test piece in cm, and
 d = depression in cm.

NOTE — For 10-cm length between supports and 2.5 cm wide test piece the formula is reduced to:

$$= \frac{100 \text{ cm}^3 \times W}{(t^3) \times d} = \frac{100 \times W}{t^3 \times d} \text{ kg/cm}^2.$$

E-6.2 Calculate for each direction the arithmetic mean stiffness modulus, to two significant figures.

E-6.3 Calculate to two significant figures for each direction the 'Stiffness' using the formula:

$$\text{Stiffness (kg/cm)} = \frac{m \times t^3}{1000}$$

where

m = stiffness modulus, and
 t = thickness in mm.

APPENDIX F

(Clause 7.1)

SAMPLING**F-1. TERMINOLOGY**

F-1.1 The following definitions as illustrated in Fig. 3 shall apply.

F-1.1.1 Unit — Quantity of leatherboard of identical specification packed together for convenience in sale, handling and accounting.

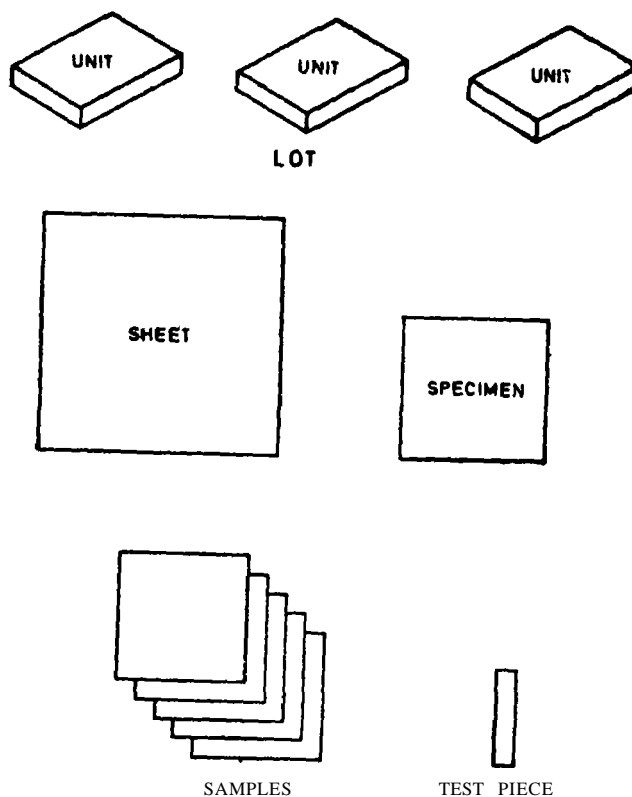


FIG. 3 ILLUSTRATION OF TERMS USED IN SAMPLING

F-1.1.2 Lot—Quantity of leatherboard of identical specification and belonging to the same batch of manufacture.

F-1.1.3 Sheet—Leatherboard drawn from a selected unit for tests.

F-1.1.4 Specimen—Sheet cut to given dimensions (generally $20 \times 20 \times 10$ cm).

F-1.1.5 Sample—All the specimens from the same unit or lot.

F-1.1.6 Test Piece—Piece of leatherboard cut from a specimen for carrying out tests.

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F-2. SCALE OF SAMPLING

F-2.1 For ascertaining the conformity of the material to the requirements of the specifications each lot as defined in **F-1.1.2** shall be examined separately.

F-2.2 The number of units to be selected from a lot shall be in accordance with col 2 of Table 3 depending upon the size of the lot as in col 1 of the same table.

TABLE 3 SCALE OF SAMPLING FOR LEATHERBOARDS

NUMBER OF UNITS IN THE LOT	NUMBER OF UNITS TO BE SELECTED
(1)	(2)
Up to 25	2
26 „ 50	3
51 „ 100	4
101 „ 500	5
501 and above	6

F-3. SELECTION OF UNITS

F-3.1 If the lot is composed of packages (bales or bundles) each containing a number of units in it, at least 20 percent of the packages, subject to a minimum of two, shall be selected at random. From the selected packages, approximately the same number of units shall be selected at random so as to give the requisite number of units required in **F-2.2**. At each stage selection shall be at random (*see F-3.3*).

F-3.2 If, however, the lot is directly composed of units, the required number of units shall be selected at random in the first stage according to **F-3.3**.

F-3.3 For the purpose of random selection, a random number table shall be used. In case a random number table is not available, the following procedure shall be adopted:

Starting from any unit in the lot, count them in one order as 1, 2, 3, . . . , up to r and so on, where r is the integral part of N/n (N being the number of units in the lot and n the number of units to be selected). Every r th unit thus counted shall be withdrawn from the lot.

F-4. SELECTION OF SHEETS

F-4.1 Select as many sheets as needed for tests required to be carried out in accordance with **F-5** taking about the same number of sheets from each selected unit.

F-4.2 The selection of sheets from a unit shall be done at random (*see F-3.3*), the intention being to ensure that the selected fully represent the unit concerned.

F-5. SELECTION AND CUTTING OF SPECIMENS

F-5.1 Cut specimens (*see F-1.1.4*) one from each sheet selected according to **F-3.3** possibly varying the position of selection from sheet to sheet.

F-5.2 Each specimen shall be provided with identification marks, this being necessary to ensure its recognition beyond all doubt. These marks should be indelible and may be limited to the number of the sampling report and the signature of the sampler. They should be in one corner and as small as possible.

F-6. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

F-6.1 Physical Requirements — Tests for all the physical requirements shall be performed on each unit selected in **F-2.2** using the specimens obtained in **F-5** for cutting test pieces. The lot shall be considered to conform to physical requirements of this specification if each unit so tested individually passes all the tests for physical requirements.

F-6.2 Chemical Requirements — Tests for all the chemical requirements shall be performed on a composite sample prepared by cutting and mixing small portions from all the units selected in **F-2.2**. The lot shall be considered to conform to chemical requirements of this specification if the composite sample passes all the tests for the chemical requirements.



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